3.2 Glacial Landscapes: Erosion Processes and Landforms: 30-minute Pack

AQA 8035 · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State what is meant by abrasion in a glacial environment, naming how transported material produces this effect on bedrock in upland valleys.

(Total for Question 1 is 1 mark)

2 State what is meant by freeze-thaw weathering in cold upland environments such as Snowdonia, and how it weakens rock.

(Total for Question 2 is 1 mark)

3 Give a concise definition of a pyramidal peak and name a named UK example in Snowdonia or the Lake District.

(Total for Question 3 is 1 mark)

4 Give TWO clear differences between a corrie and a U-shaped glacial trough in terms of form and location.

(Total for Question 4 is 2 marks)

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5 Explain the formation of a corrie (cirque) in a glacial upland landscape.

(Total for Question 5 is 6 marks)

6 OS map-extract practice, Snowdonia: an OS map extract is described below. Cwm Idwal is labelled and a small lake, Llyn Idwal, is marked within a bowl-shaped hollow on the mountainside. The contours are steep on three sides of the hollow, with a flatter outlet to the valley below. Identify the named erosional feature shown and explain briefly how the map evidence supports your identification.

(Total for Question 6 is 4 marks)

7 Explain how a hanging valley forms, and name why waterfalls might appear where a hanging valley meets the main glacial trough.

(Total for Question 7 is 4 marks)

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8 Table A gives pre glaciation valley depths and post glaciation valley depths for three upland valleys in Snowdonia. Use these figures to calculate the mean depth increase caused by glacial erosion, showing your working.

Valley	Depth before glaciation (m)	Depth after glaciation (m)
Vale A	120	420
Vale B	95	340
Vale C	150	460

(Total for Question 8 is 3 marks)

9 In words, describe the sequence of processes that form a corrie, using five clear stages that include snow accumulation, nivation, freeze-thaw, plucking and abrasion. Provide brief, ordered points suitable for annotating a diagram.

(Total for Question 9 is 5 marks)

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Mark scheme · 3.2 Glacial Landscapes: Erosion Processes and Landforms: 30-minute Pack

Question 1

the scraping and grinding of bedrock by rock fragments embedded in the base or sides of a glacier, oe **B1**

Answer: Abrasion is the scraping and grinding of bedrock by rock fragments carried in the base or sides of a glacier.

Question 2

water enters cracks, freezes and expands, widening cracks and breaking rock into fragments over repeated cycles, oe **B1**

Answer: Freeze-thaw weathering is when water enters rock cracks, freezes and expands, widening the cracks and causing rock to break into fragments after repeated cycles.

Question 3

a sharp peak formed where three or more corries cut back into a mountain, oe; named example earns B1 **B1**

Answer: A pyramidal peak is a sharp mountain summit formed where three or more corries cut back into the massif; an example is Yr Wyddfa (Snowdon) in Snowdonia.

Question 4

difference 1: a corrie is a bowl-shaped hollow on a mountainside, whereas a glacial trough is a long valley with steep sides and a flat floor, oe **B1**

difference 2: corries are located at the head of glacial valleys and often contain a tarn, whereas troughs run down the valley and may contain ribbon lakes, oe **B1**

Answer: A corrie is a bowl-shaped hollow on a mountainside, while a U-shaped glacial trough is a long valley with steep sides and a flat floor; corries occur at valley heads often with a tarn, whereas troughs run down-valley and may contain ribbon lakes.

Question 5

Level 3 Detailed explanation that describes the full sequence of processes (accumulation, nivation/freeze-thaw, rotational movement, abrasion, plucking and post-glacial modification), uses accurate specialist terms and links processes to resulting corrie features. May use a named example such as Cwm Idwal. **5-6**

Level 2 A clear explanation covering several relevant processes (for example freeze-thaw, plucking and abrasion) with some linkage to corrie features, but with less detail or fewer stages. **3-4**

Level 1 Simple statements about one or two processes or features with limited development, for example stating that ice erodes hollows to form corries. **1-2**

Level 0 No relevant content. **0**

Indicative content:

- Snow accumulates in a hollow and compacts to form neve and glacier ice, especially on north-facing hollows in Snowdonia such as Cwm Idwal.
- Freeze-thaw weathering widens cracks in the back wall, producing loose material and assisting headward erosion.
- Nivation (the combined action of freeze-thaw and meltwater) and gravity help enlarge the hollow before permanent ice develops.
- Rotational movement of the small corrie glacier causes abrasion of the basin floor, scouring and deepening the hollow.
- Plucking at the back wall occurs when meltwater freezes in joints and is pulled away by moving ice, steepening the back wall.
- A rock lip or threshold may form at the corrie mouth due to reduced erosion at the glacier snout or deposition of rock, allowing a tarn to persist after ice retreats.
- Reference to a named example such as Cwm Idwal or Llyn Idwal supports answers that place processes in a UK context.

Question 6

identification of the feature as a corrie or cirque (Cwm Idwal) or corrie occupied by a tarn, oe **B1**

evidence: bowl-shaped contours and steep back wall shown by close contour spacing, oe **B1**

evidence: lake within the hollow (Llyn Idwal) indicates a corrie basin, oe **B1**

evidence: a flatter outlet or lip at the front leading down to the valley supports corrie formation, oe **B1**

Answer: The feature is a corrie (cirque), specifically Cwm Idwal with Llyn Idwal; map evidence includes a bowl-shaped set of contours with steep back wall indicated by close contour spacing, a small lake in the basin, and a flatter outlet or lip leading down to the valley.

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Question 7

tributary valleys are occupied by smaller glaciers that erode less deeply than the main glacier in the trunk valley, oe	**B1**
after ice retreats the tributary valley floor is left higher than the main valley floor, forming a hanging valley, oe	**B1**
a stream from the hanging valley falls down to the lower main valley, creating a waterfall, oe	**B1**
the waterfall exists because of the difference in elevation between the less-eroded tributary and the overdeepened main trough, oe	**B1**

Answer: Hanging valleys form because smaller tributary glaciers erode their valleys less deeply than the main glacier, so when the ice retreats the tributary valley floor is left higher than the main trough; a stream from the hanging valley then falls to the lower main valley creating a waterfall due to the difference in elevation.

Question 8

calculate individual depth increases: 420-120, 340-95, 460-150 seen, oe	**M1**
sum the increases and divide by 3 seen, oe	**M1**
285 m cao	**A1**

Answer: 285 m.

Question 9

snow accumulates in a hollow and compacts to form neve and ice, oe	**B1**
nivation: a patch of snow enlarges the hollow beneath it through weathering and meltwater erosion, oe	**B1**
freeze-thaw: water in cracks freezes and expands, loosening rock around the hollow, oe	**B1**
abrasion: rotational movement of the small glacier scours and deepens the basin, oe	**B1**
plucking: the ice pulls blocks of rock from the back wall, steepening it, oe. Stages may be in any sensible order. Accept, in place of any one stage above, a stage describing the corrie after the ice melts: a steep back wall, a lip and often a tarn in the basin, oe	**B1**

Answer: 1) Snow accumulates in a hollow and compacts into neve and ice. 2) Nivation: the snow patch enlarges the hollow. 3) Freeze-thaw weathering loosens the rock around it. 4) Abrasion: the rotating ice scours and deepens the basin. 5) Plucking removes blocks from the back wall, steepening it. After the ice melts the hollow is a corrie, often with a tarn, a steep back wall and a lip at the front.

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